REMARKS

The above amendment and these remarks are responsive to the Office Action of Daniel J. Chung mailed 28 March 2003.

Claims 1-25 are in the case, claims 8-10 and 13 having been objected to are represented as claims 22-25, and claims 1-7, 11-12, and 14-21 have been rejected.

Drawings

Applicant's attorney has had formal drawings prepared for submission to the USPTO, and will do so upon returning to his office in early July from extended vacation.

Specification

Applicants have amended the specification to correct a misspelled word. The reference to the paragraph location may be off due to reformatting (applicants' attorney is traveling, and only has access to an electronic version of the case as originally filed).

35 U.S.C. 102

Claims 1-4, 14-19 and 21 have been rejected under 35 U.S.C. 102(b) over Frei (5,159,201).

Frei, as also applicants' invention presume that the generated output is utilized by some type of artwork generation tool. These machines vary in capability and also data requirements.

The Frei patent presumes a 'flash' type artwork machine. In this type of artwork machine, an aperture (also called a reticle) of a specific size and shape opens for a sufficient period of time in order to expose an artwork surface. The head of the machine then relocates appropriately for the next shape. The process then repeats using the (possibly new) aperture size and shape for the current shape. Normally this type of machine is said to be limited to orthogonal flashes. In fact, this statement is not true, but in practice it tends to be the end result. The following example illustrates the point: Consider a rectangle 5 units wide and 20 units long. Now assume that you want this rectangle oriented at 0 degrees, 1 degree, 2

degrees, etc. through 179 degrees. That would require 180 separate reticles - certainly a daunting task for such a trivial change. Since flash type artwork machines have a limit on the number of reticles which can be loaded, this hardware limitation often trickles into the algorithms for data generation.

Applicants' invention supports more advanced 'trace' type artwork machines. In this type of artwork machine, the aperture opens to form a narrow rectangular slit. With the aperture remaining open, the head of the machine moves to trace the centerline of the rectangle in question. The advantage of this type of machine is elimination of the need for creating unique reticle sizes/shapes. In the example sited above, the 180 differently angled rectangles could be traced without the need for unique reticles.

While neither applicants' claims nor the Frei reference focus on the destination artwork generation tool (as this is not the subject of the present application nor of the Frei patent), none the less, the selected tool will have a profound impact on the data generation algorithm. Despite the fact that applicants' claimed invention and the Frei reference have certain things in common, they have

considerable differences and many of the differences will be traced back to artwork machine requirements just described.

Applicants traverse the rejection of claims 1-4, 14-19 and 21 over Frei, and argue that the Examiner has not made the required prima facie case of anticipation, which requires that the Examiner provides

1. a single reference
2. that teaches or enables
3. each of the claimed elements (arranged as in the claim)
4. expressly or inherently
5. as interpreted by one of ordinary skill in the art.

With respect to the third element, it is not enough that the prior art reference disclose all the claimed elements in isolation. Rather, as stated by the Federal Circuit, the prior art reference must disclose each element of the claimed invention "arranged as in the claim." The Examiner, further, must identify the elements of the claims of the application, determine their meaning in light of the specification and prosecution history, and identify the

corresponding elements disclosed in the allegedly anticipating reference. Further, anticipation will not be found when the prior art is lacking or missing a specific feature or structure of the claimed invention.

With respect to claim 1, applicants are claiming that we begin filling a polygon by 'bordering' it (i.e., that is, by creating fill shapes which parallel the border and fall entirely within the original polygon). These border shapes are allowed to be non-orthogonal. Following the bordering step we fill the remaining interior orthogonally.

Frei, on the other hand, has no bordering step. He does not address the capability of generating non-orthogonal rectangles due to the limitations imposed by the artwork generation tool being utilized. Skipping the bordering step has a profound impact on Frie's polygon fill algorithm. As described in column 18, lines 40-60, Frei detects and corrects the "staircase" effect caused by orthogonally filling the original polygon.

(In addition, applicants' claim 1 preamble also states that "a minimum number of rectangles" are produced. Frei makes no such claim. Applicants are able to make this

claim because their algorithm is optimized to (1) create non-orthogonal fill shapes and (2) because fill shapes are merged where possible. Frei could never make such a claim (i.e., to create a minimum number of rectangles) because he is restricted to preferring orthogonal fill shapes which are inherently less efficient for filling non-orthogonal polygons.)

Claim 2 essentially states that the polygon fill algorithm is a three step process (create a border, fill orthogonally, then check for uncovered areas).

The discussion of Claim 1 covers the first two steps of the three step algorithm of claim 2, and claim 2 distinguishes Frei on the same bases. Further, the third step of claim 2 is necessary due to the fact that applicants create non-orthogonal fill shapes. These occur most frequently in fill areas near very acute (i.e. narrow) angles especially where a large border width was selected. Since Frei does not deal with non-orthogonal fill shapes, he does not address this issue.

Claims 3 and 4 depend from claim 2, and are similarly distinguished from Frei.

Further with respect to claim 4: this claim defines the stripe overlap amount as an input parameter. This parameter controls how much two adjacent stripes overlap. Stripe overlap can be a requirement for certain machines with tolerance problems to avoid creating unfilled slivers when the numerical data is implemented on an expose machine. In applicants invention, stripe overlap is regarded as a positive feature of the data generation process.

Frei has a different definition for overlap. In Column 3, Lines 18-35, Frei explains that overlaps are an undesirable result of the designer's actions (where he creates a single complex shape by combining two or more simple shapes) and not a desirable or customizable feature of the fill process. Frei's algorithm detects and attempts to eliminate these undesirable overlaps. Hence, the handling and treatment of overlapping stripes is completely different between Frei and applicants' invention.

As the Examiner notes, claims 14-19 and 21 are similar in scope to claims 1-3. Thus, these claims are distinguished from Frei as discussed above with respect to claims 1-3.

35 U.S.C. 103

Claim 5 has been rejected under 35 U.S.C. 103(a) over Frei in view of Goyins et al (5,461,703).

Claims 6-7, 11-12 and 20 have been rejected under 35 U.S.C. 103(a) over Frei in view of Dyches et al (5,461,703). (Applicants believe that this citation of Dyches is in error, for it cites the patent number for the Goyins patent, and is assumed for the purpose of this response to be Dyches 5,644,691.)

Frei has been discussed above with respect to the rejection under 35 U.S.C. 102.

The Goyins algorithm is pixel based. In other words, Goyins is working at a very low level (very close to the machine level). He has an inherent understanding of the size of a pixel and the spacing between adjacent pixels. As he attempts to fill polygons, he decides if a pixel is either on or off. When data is split across a pixel,

Goyins has logic to determine if the pixel should be switched on or off (since one can not turn half a pixel on and the other half off). By contrast, applicants' invention and the Frei patent are a step above the pixel level, and both focus on numeric coordinates and assume that if pixel level data is required, it will performed by other software.

Applicants traverse, and argue that the Examiner has not established a prima facie case of obviousness, which requires that the Examiner provides

1. one or more references
2. that were available to the inventor and
3. that teach
4. a suggestion to combine or modify the references,
5. the combination or modification of which would appear to be sufficient to have made the claimed invention obvious to one of ordinary skill in the art.

The fourth element of the prima facie case, the suggestion to combine, must come from the prior art. It is insufficient to establish obviousness that the separate elements of the invention existed in the prior art, absent

some teaching or suggestion, in the prior art, to combine the elements. That a claimed invention may employ known principles does not itself establish that the invention would have been obvious, particularly where those principles are employed to deal with different problems. The Examiner must consider the claim as a whole, and not piece together the claimed invention using the claims as a guide. The Federal Circuit has stated: "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

With respect to claim 5: this claim identifies two important input parameters: wires-with-ends-size-delta and the maximum-number-of-borders as input parameters. Here are definitions of each:

> Wires-with-ends-size-delta. First off, it is necessary to understand the difference between a wire-with-ends (wwe) and a wire-with-no-ends (wne). Applicants Figures 2 and 3 show an example of each. Some artwork machines demand one format and other machines accept only the other format. The problem which can arise is that a wire-with-ends be created where end points 'a' and 'b' are identical or nearly

so. This can create a problem at the artwork machine. By specifying a wires-with-ends-size-delta value of, say 2, we are dictating that any wwe fill wires will be at least 2 units longer than they are wide.

Maximum-number-of-borders. Bordering a polygon will stop under certain criterial. One of the key criteria is exceeding the maximum number of borders. When this point is reached, polygon fill switches to orthogonal filling.

The Examiner introduces the Goyins patent and suggests that it could logically have been applied to the Frei patent. Applicants argue that this is not supportable for the following three reasons:

First, the Goyins algorithm is pixel based while Frei's is shapes based. The implications of this difference are profound, which is why Goyins spends a lot of time describing how he maps shapes into pixels. As an example (Column 2, lines 20+), Goyins describes how he analyzes a polygon edge to determine if it is horizontal or non-horizontal. Horizontal edges are skipped. Non-horizontal edges activate pixel inversion logic. Goyins apparently

builds a pixel array in memory which reflects (as accurately as possible) the polygon image. By contrast, neither applicants' invention or Frei's patent deal with pixel arrays, pixel inversion, or special treatment (i.e. Skipping) of horizontal edges. Rather, we deal with generation of mostly rectangular fill shapes.

Second, neither Frei or Goyins discuss wires-with-ends or more specifically the wires-with-ends-size-delta input parameter introduced in Claim 5.

Finally, neither Frei or Goyins generate non-orthogonal border fill segments or more specifically teach the maximum-number-of-borders parameter of the claim.

Next, with respect to claims 6-7, 11-12 and 20.

Claim 6 depends from claims 2 and 3, and further elaborates on how a particular border width is selected, how border merging occurs, and when it is practical to terminated bordering in favor of orthogonal fill.

As previously discussed, Frei does not utilize bordering logic.

Dyches also does not utilize bordering logic. Dyches focuses on speeding up polygon fill by subsetting polygons into those which are candidates for accelerated data generation and those that are not. We do no such sorting since we regard all polygons as candidates for fill using a single algorithm. Furthermore, Dyches algorithm decomposes the original polygon (for those polygons following the expedited data generation path) into a single rectangle and one or more smaller polygons (refer to Summary of Invention, paragraph 1). This logic is completely different from our logic where we begin by bordering the polygon.

Claim 7 depends from claim 6, and further elaborates on how one may optionally elect to reduce the border width. Normally it is advantageous to utilize the maximum stripe width allowed since this tends to generate less fill shapes. However, too much of a good thing can be bad. For certain polygons, especially those with extremely acute angles, a small border width is desirable. In practice, due to applicants' shape merging logic, border segments not entering the acute angle will get merged anyway, so the number of additional fill shapes is limited geographically.

The examiner references Frei (Fig 1, Fig 7A-B, Fig 13A-C) but as pointed out on numerous earlier occasions, Frei does not generate non-orthogonal fill shapes, so these references cannot be compared to Claim 7.

Claim 11 depends from claim 6 and further elaborates on the details of generating orthogonal fill shapes, and is distinguished from the combination of Frei and Dyches as discussed previously. The logic which occurs is to determine if it would be more efficient (i.e. less stripes) to generate horizontal or vertical fill stripes and then to proceed with stripe generation.

Frei is less concerned with minimizing the number of rectangles as he is in insuring that the triangles created by the staircase are uniform (column 18, lines 40-60) in size. His decision to paint horizontally versus vertically is based on different logic, logic which is unrelated to applicants' Claim 11.

Claim 12 depends from claim 6, and further relates to how applicants locate unfilled areas which sometimes occur along the border of a polygon (in acute angles) and sometimes even within the interior (caused by relatively

large rectangle widths).

As explained previously with respect to claim 6, Dyches focuses on a very limited aspect of polygon fill - those polygons which fit certain criteria (e.g. those polygons which can be decomposed into a rectangle and one or more smaller polygons). Applicants do not sort polygons in this manner and the claimed fill algorithm greatly differs from that of Dyches. Dyches does not elaborate on the subject matter of applicants claim 12.

Further, with respect to Frei, Figure 1 makes no reference to checking for or processing uncovered areas; Figures 7A-B make no reference to checking for or processing uncovered areas; and Figure 8 makes no reference to checking for or processing uncovered areas.

With respect to claim 20, as the Examiner observes, this claim is similar in scope to claims 2 and 6. Therefore, claim 20 is distinguished from the combination of Frei and Dyches as discussed with respect to claim 6.

Allowable Subject Matter

Claims 8-10 and 13 have been objected to as depending from a rejected base claim.

Applicants submit herewith claims 22-25 corresponding to claims 8-10 and 13, respectively, with claim 22 redrawn in independent format incorporating the limitations of the base and intervening claims, and claims 23-25 depending from claim 22.

SUMMARY AND CONCLUSION

Applicants urge that the above amendments be entered and the case passed to issue with claims 1-25.

If, in the opinion of the Examiner, a telephone conversation with applicant(s) attorney could possibly facilitate prosecution of the case, he may be reached at the number noted below.

Sincerely,

R. G. Bednar, et al.

By

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